

What is claimed is:

1. A transparent electroconductive film comprising:

a polymer film;

a primary layer formed on said polymer film; and

a transparent electroconductive thin film formed on said primary layer.

2. A transparent electroconductive film as claimed in claim 1, wherein said primary layer is made of silicon compound.

3. A transparent electroconductive film as claimed in claim 2, wherein said silicon compound is at least one selected from the group consisting of  $\text{SiC}_x$ ,  $\text{SiO}_x$ ,  $\text{SiN}_x$ ,  $\text{SiC}_x\text{O}_y$ ,  $\text{SiC}_x\text{N}_y$ ,  $\text{SiO}_x\text{N}_y$ , and  $\text{SiC}_x\text{O}_y\text{N}_z$ .

4. A transparent electroconductive film as claimed in claim 2 or 3, wherein said primary layer is formed by vapor deposition.

5. A transparent electroconductive film as claimed in any one of claims 1 to 4, wherein said primary layer has a thickness of 1 nm to 50  $\mu\text{m}$ .

6. A transparent electroconductive film as claimed in claim 1, wherein said primary layer is formed by coating said polymer film with ultraviolet-curing resin including particles of at least one silicon compound selected from the group consisting of  $\text{SiC}_x$ ,  $\text{SiO}_x$ ,  $\text{SiN}_x$ ,  $\text{SiC}_x\text{O}_y$ ,  $\text{SiC}_x\text{N}_y$ ,  $\text{SiO}_x\text{N}_y$ , and  $\text{SiC}_x\text{O}_y\text{N}_z$ .

7. A transparent electroconductive film as claimed in claim 6, wherein each of said particles of silicon compound is provided with acryl groups, epoxy groups or carboxyl groups on its surface.

8. A transparent electroconductive film as claimed in claim 7, wherein said particles of silicon compound are particles of acryl-modified silica which are produced by condensing colloidal silica and acryl group-modified

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silane compound.

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9. A transparent electroconductive film as claimed in any one of claims 5 to 8, wherein said particles of silicon compound have an average diameter of 1nm to 5  $\mu$  m, and are included in said primary layer at a weight percentage of 1 to 90% to said ultraviolet-curing resin.

10. A transparent electroconductive film as claimed in any one of claims 5 to 9, wherein said primary layer has a thickness of 1nm to 10  $\mu$  m.

11. A transparent electroconductive film as claimed in any one of claims 1 to 10, wherein said electroconductive thin film consists of metal oxide.

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12. A transparent electroconductive film as claimed in claim 11, wherein said metal oxide is at least one selected from the group consisting of ITO, ATO, ZnO, ZnO doped with Al, and SnO<sub>2</sub>.

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13. A transparent electroconductive film as claimed in claim 11 or 12, wherein said electroconductive thin film has a thickness of 1 to 500nm.

14. A method for manufacturing a transparent electroconductive film as claimed in any one of claims 2 to 4, wherein said method includes a process of forming said primary layer by coating said polymer film with said silicon compound or a liquid substrate including said silicon compound.

15. A method for manufacturing a transparent electroconductive film as claimed in claim 5, wherein said method includes a process of forming said primary layer by depositing said silicon compound on said polymer film by a physical vapor-depositing process such as vacuum spraying process, sputtering process, ion plating process, or by a chemical vapor-depositing process such as CVD process.

16. A method for manufacturing a transparent electroconductive film as claimed in claim 15, wherein the sputtering process employs Si, SiC, SiO,

SiO<sub>2</sub> or Si<sub>3</sub>N<sub>4</sub> as a target material.

17. A method for manufacturing a transparent electroconductive film as claimed in claim 16, wherein the SiC target having a density of 2.9g/cm<sup>3</sup> or more is used as said target material.

18. A method for manufacturing a transparent electroconductive film as claimed in claim 16, wherein the SiC target which is produced by sintering a mixture composed of silicon carbide powder and a nonmetal-based sintering assistant is used as said target material.

19. A method for manufacturing a transparent electroconductive film as claimed in claim 3, wherein said method includes a process of forming said primary layer by coating said polymer film with ultraviolet-curing resin including particles of at least one silicon compound selected from the group consisting of SiC<sub>x</sub>, SiO<sub>x</sub>, SiN<sub>x</sub>, SiC<sub>x</sub>O<sub>y</sub>, SiC<sub>x</sub>N<sub>y</sub>, SiO<sub>x</sub>N<sub>y</sub>, and SiC<sub>x</sub>O<sub>y</sub>N<sub>z</sub>.

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20. A touch panel, wherein said touch panel is equipped with a transparent electroconductive film as claimed in any one of claims 1 to 13.

21. A touch panel, wherein said touch panel is equipped with a transparent electroconductive film produced by a method for manufacturing a transparent electroconductive film as claimed in any one of claims 14 to 19.

22. A transparent electroconductive film comprising:

a polymer film;

a primary layer formed on said polymer film; and

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a multi-lamination film comprising at least one metal-compound layer and at least one electroconductive-metal layer formed on said primary layer.

23. A transparent electroconductive film as claimed in claim 22, wherein

~~said primary layer is made of silicon compound.~~

24. A transparent electroconductive film as claimed in claim 23, wherein said silicon compound is at least one selected from the group consisting of  $\text{SiC}_x$ ,  $\text{SiO}_x$ ,  $\text{SiN}_x$ ,  $\text{SiC}_x\text{O}_y$ ,  $\text{SiC}_x\text{N}_y$ ,  $\text{SiO}_x\text{N}_y$ , and  $\text{SiC}_x\text{O}_y\text{N}_z$ .

Sub A5 25. A transparent electroconductive film as claimed in claim 23 or 24, wherein said primary layer is a layer formed by vapor deposition.

26. A transparent electroconductive film as claimed in any one of claims 22 to 25, wherein said primary layer has a thickness of 1nm to 50  $\mu\text{m}$ .

27. A transparent electroconductive film as claimed in claim 22, wherein said primary layer is formed by coating said polymer film with ultraviolet-curing resin including particles of at least one silicon compound selected from the group consisting of  $\text{SiC}_x$ ,  $\text{SiO}_x$ ,  $\text{SiN}_x$ ,  $\text{SiC}_x\text{O}_y$ ,  $\text{SiC}_x\text{N}_y$ ,  $\text{SiO}_x\text{N}_y$ , and  $\text{SiC}_x\text{O}_y\text{N}_z$ .

28. A transparent electroconductive film as claimed in claim 27, wherein each of said particles of silicon compound is provided with acryl groups, epoxy groups or carboxyl groups on its surface.

Sub B5 29. A transparent electroconductive film as claimed in claim 28, wherein said particles of silicon compound are particles of acryl-modified silica which are produced by condensing colloidal silica and acryl group-modified silane compound.

Sub A6 30. A transparent electroconductive film as claimed in any one of claims 27 to 29, wherein said particles of silicon compound have an average diameter of 1nm to 5  $\mu\text{m}$ , and are included in said primary layer at a weight percentage of 1 to 90% to said ultraviolet-curing resin.

31. A transparent electroconductive film as claimed in any one of claims 27 to 30, wherein said primary layer has a thickness of 1nm to 10  $\mu\text{m}$ .

32. A transparent electroconductive film as claimed in any one of claims 22 to 31, wherein said metal-compound layer is made up of at least one selected from the group consisting of ITO,  $\text{In}_2\text{O}_3$ ,  $\text{SnO}_2$ ,  $\text{ZnO}$ ,  $\text{TiO}_2$ ,  $\text{SiO}_2$  and  $\text{SiN}$ .

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33. A transparent electroconductive film as claimed in any one of claims 22 to 31, wherein said metal-compound layer is made up of composite metal composed of at least two selected from the group consisting of ITO,  $\text{In}_2\text{O}_3$ ,  $\text{SnO}_2$ ,  $\text{ZnO}$ ,  $\text{TiO}_2$ ,  $\text{SiO}_2$  and  $\text{SiN}$ .

34. A transparent electroconductive film as claimed in any one of claims 22 to 33, wherein said electroconductive-metal layer is made up of at least one selected from the group consisting of Ag, Au, Pt, Cu, Al, Cr, Ti, Zn, Sn, Ni, Co, Hf, Nb, Ta, W, Zr, Pb, Pd and In.

35. A transparent electroconductive film as claimed in any one of claims 22 to 34, wherein said multi-lamination film is composed of metal-compound layers and electroconductive-metal layers which are laminated on, alternately.

36. A method for manufacturing a transparent electroconductive film as claimed in any one of claims 22 to 35, wherein said method includes a process of forming said primary layer by coating said polymer film with said silicon compound or a liquid substrate including said silicon compound.

37. A method for manufacturing a transparent electroconductive film claimed in any one of claims 22 to 36, wherein said method includes a process of forming said primary layer by depositing said silicon compound on said polymer film by a physical vapor - depositing process such as vacuum spraying process, sputtering process, ion plating process, etc., or

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by a chemical vapor-depositing process such as CVD process, etc.

38. A method for manufacturing a transparent electroconductive film as claimed in claim 37, wherein the sputtering process employs Si, SiC, SiO, SiO<sub>2</sub> or Si<sub>3</sub>N<sub>4</sub> as a target material.

39. A method for manufacturing a transparent electroconductive film as claimed in claim 38, wherein the SiC target having a density of 2.9g/cm<sup>3</sup> or more is used as said target material.

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40. A method for manufacturing a transparent electroconductive film as claimed in any one of claims 37 to 39, wherein the SiC target which is produced by sintering a mixture composed of silicon carbide powder and a nonmetal-based sintering assistant is used as said target material.